



BY _____ DATE _____ DIV _____ SHEET _____ OF _____
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SUBJECT _____

TO: C. J. WALTERS, REGION III CDC LIAISON

FROM: ROBERT MARGUCCIO, TAT REGION III
WESTON, INC.

THRU: JEFFREY PIKE, OSC REGION III

RE: LOCUST STREET PLAYGROUND BULK SAMPLE RESULTS

DATE: 10-5-84

AR001456

STRUCTURE PROBE[®]

SPECIALISTS IN MATERIALS RESEARCH

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TECHNICAL REPORT #50002

RESEARCH STUDY TO
IDENTIFY SUSPECTED ASBESTOS
IN NINE SAMPLES USING
POLARIZED LIGHT MICROSCOPY/
DISPERSION STAINING TECHNIQUES

PREPARED FOR:

MR. JAMES BROWN
GUARDIAN CONSTRUCTION CO.
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BEAR, DE 19701

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PREPARED BY:

STRUCTURE PROBE, INC.

Eugene E. Roder
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METALLOGRAPHER

Stephen Duerr
J. STEPHEN DUERR, Ph.D., P.E.
TECHNICAL DIRECTOR

DATE: OCTOBER 3, 1984

WORK NO: R0545
P.O. NO: 925
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ABSTRACT

An investigation of nine samples by polarized light microscopy and dispersion staining techniques revealed the presence of chrysotile asbestos in one of the nine samples. Samples were received on September 26, 1984 via Emery Worldwide. The shipping container was sealed with an official USEPA tape seal placed on by Mr. Robert Marguccio on September 25, 1984.

The samples were in individual glass containers and also were sealed with an official USEPA tape seal placed on by Mr. Robert Marguccio and dated September 24, 1984. The samples were designated as follows:

1	LS01	Locust St. P.G.
2	LS02	Locust St. P.G.
3	LS03	Locust St. P.G.
4	LS04	Locust St. P.G.
5	LS05	Locust St. P.G.
6	LS06	Locust St. P.G.
7	LS07	Locust St. P.G.
8	LS08	Locust St. P.G.
9	LS09	Locust St. P.G.

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I. INTRODUCTION

Nine soil samples in 16oz. glass jars were submitted by Mr. Robert Marguccio of Roy F. Weston Inc. for identification of possible asbestiform material by polarized light microscopy and dispersion staining techniques. These and other microscopy/microanalysis techniques are discussed briefly in the Guide to Analytical Research Services in the Appendix.

Polarized light microscopy/dispersion staining (PLM/DS) is a method for determining the unique optical crystallographic properties of various crystal phases in a sample. PLM/DS is an invaluable tool in the identification of crystalline materials such as asbestos. It is basically a particle identification technique based on the difference between refractive index dispersion of a particle and of the liquid medium in which the particle is immersed. Two different procedures are based on the use of stops in the objective back focal plane; both procedures give colored particle boundaries. An annular stop shows a color consisting of wavelengths near that at which particle and medium match in refractive index; a central stop shows colors complementary to those shown by the annular stop, that is, light of wavelengths refracted by the particle in that medium.

These effects make it possible to systematically identify transparent substances by their dispersion colors in known refractive index media. The procedure has been applied to refractive index determination, identification of quartz in lung tissue, determination of toxic dusts, particle counting, identification of glass fragments, identification of asbestos, mineral characterization, identification of settled dust and fiber identification.

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II. PROCEDURE

For the light microscopy portion of this study, a procedure similar to the EPA "Interim Method for the Determination of Abestos in Bulk Insulation Samples" was used. The samples were first viewed under the stereomicroscope to determine homogeneity. A portion was then mixed with a drop of 1.550 refractive index liquid on a clean glass slide. Cover slips were added and the slide was placed on the light microscope stage. The sample was viewed at 100X in transmitted light under polarized light using a dispersion staining central stop. The fibers were identified according to their structure, birefringence and dispersion colors. Various refractive index liquids were used to identify individual types of fibers and representative photomicrographs were taken.

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III. RESULTS AND DISCUSSION

Results of fiber identification by PLM/DS are given in Data Section A of this report.

Only Sample LS04 revealed the presence of asbestos. This sample was found to contain less than 1% chrysotile. A photomicrograph of chrysotile asbestos (double exposure) exhibiting its dispersion staining colors in the appropriate refractive index liquid (1.550 H.D.) is given in Data Section B. No asbestos was observed in any of the other eight samples.

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IV. CONCLUSIONS

Polarized light microscopy/dispersion staining revealed less than 1% chrysotile asbestos in Sample LS04. Asbestos was not observed in any of the other eight samples.

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V. DATA

A. DISPERSION STAINING RESULTS

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Table 1

Dispersion Staining Results

<u>Sample No.</u>	<u>Asbestos Type</u>	<u>Percent</u>	<u>Other Fibers</u>	<u>Non-Fibrous</u>
LS01	-	0	Cellulose	Various Minerals
LS02	-	0	Cellulose	Various Minerals
LS03	-	0	Cellulose	Various Minerals
LS04	Chrysotile	<1	Cellulose	Various Minerals
LS05	-	0	Cellulose	Mica, Various Minerals
LS06	-	0	Cellulose	Various Minerals
LS07	-	0	Cellulose	Various Minerals
LS08	-	0	Glass Cellulose	Various Minerals
LS09	-	0	Cellulose	Various Minerals

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B. PHOTOMICROGRAPH



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VI. APPENDIX

A. A FEW WORDS ABOUT STRUCTURE PROBE, INC.

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A Few Words About Structure Probe, Inc.

Structure Probe, Inc. was established in May, 1970 by Charles A. Garber, Ph. D., who is still the President and Chief Executive Officer of the firm.

From the starting point of one scanning electron microscope and three employees, Dr. Garber has directed the company's growth into four laboratory locations with 40 employees and more than \$1,000,000 in electron optical equipment. Structure Probe, Inc. today is respected for innovative work in the electron optics field and is the only independent laboratory capable of performing in-house analytical STEM analysis on a JEOL 100 CX scanning transmission electron microscope.

The Structure Probe, Inc. reputation as SPECIALISTS IN MATERIALS RESEARCH is due largely to a highly skilled and discipline-oriented technical staff. Our experts have been involved, for many years, in the fields of cosmetics, polymers and polymer coatings, chemistry, ceramics, metallurgy, micro-electronics, biology and physics.

The SPI Supplies Division of Structure Probe, Inc. is known, both in this country and abroad, as a leading source for consumable supply items of the type used in the routine operation of the typical scanning and transmission electron microscope laboratory.

Structure Probe, Inc. is also a member of The American Council of Independent Laboratories, Inc. (ACIL), established in 1937, a professional association of roughly 300 independent scientific laboratories dedicated to the promotion of high ethical and professional standards in the laboratory community.

Dr. Garber is an active member of the ACIL and has testified several times before committees of the United States Congress on subjects involving small technology-based firms and, most recently, technical innovation in small firms.

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B. CERTIFICATE OF CALIBRATION

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Certificate of Calibration

The electron optical and other analytical research instrumentation used for the present investigation were last calibrated on the dates shown below. The relevant monthly calibration procedures are detailed in the Qualification Manual for Analytical Research Services available at any of the Structure Probe locations. The procedures used are based upon NBS traceable standards when available and if not available, on industry accepted procedures.

Limitations concerned with differences in individual client samples with regard to composition, size, and configuration can influence the results for a given application regardless of instrument performance during calibration checks. Some of the more serious limitations relating to this particular analysis are noted below.

Nevertheless, the reported calibrations and standardizations of our analytical research instrumentation express, to the best of our knowledge, the latest operating condition(s) prior to our analysis of your sample(s).

<u>INSTRUMENT</u>	<u>DATE LAST CALIBRATED</u>	<u>LOCATION</u>	<u>INITIALS</u>	<u>COMMENTS</u>
TEM	_____	_____	_____	_____
SEM	_____	_____	_____	_____
EDS	_____	_____	_____	_____
WDS	_____	_____	_____	_____
SAM	_____	_____	_____	_____
XPS	_____	_____	_____	_____
QIA	_____	_____	_____	_____
✓ LM	9/5/84	NJ.	EEB	_____

IMPORTANT NOTES TO ABOVE

1. For SEM calibration, one should be aware that the actual magnification for non-flat or odd-size samples may vary considerably along the topographical variations of the surface depending on the deviation from "standard" working distance.
2. For EDS analyses, it is quite possible that low levels of extraneous x-ray fluorescence may result from within the electron optical column. Although steps are taken to minimize those effects, we make every effort to point them out when such artifacts do occur. In addition, small "escape" and "sum" peaks could also turn up in the final scan. If indeed there is ever any suspicion about the validity of a particular peak assignment, contact us for further explanation or confirming analysis.

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C. AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION

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American Association for Laboratory Accreditation
(AALA)

Since 1980, Structure Probe laboratories have been regularly inspected by the American Association for Laboratory Accreditation (AALA). At the present time, Structure Probe is the only laboratory accredited in the subdiscipline of "microscopy".

The AALA program involves accreditation of discipline; in other words, laboratories are accredited for performance of groups of tests or specific tests within a discipline of testing. Individual laboratories may be accredited in more than one discipline and for one or more types of tests (subdisciplines within each discipline).

The evaluation process of discipline accreditation covers the technical and ethical competence and quality control procedures for the disciplines/groups of tests enumerated in the laboratory's application for accreditation. This process permits accreditation of the laboratory for essentially all of its capabilities rather than test by test (or product by product).

Electrons optics falls into the AALA Technical Discipline of "Chemical Testing".

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D. RESUMES OF KEY PERSONNEL INVOLVED WITH THIS PROJECT

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RESUME

EUGENE E. RODEK, Metallographer
Structure Probe, Inc.
Metuchen, NJ

Education

1981 to date Thomas Edison College
Trenton, NJ

1975-76 Physics
Rutgers University
New Brunswick, NJ

Professional Societies

New York Microscopical Society

Professional Employment Experience

March 82 to date Metallographer
Structure Probe, Inc.
Metuchen, NJ

May 1976 to Sorter (Asst. Shop Steward 1979-1982)
March 1982 United Parcel Service
Edison, NJ

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RESUME

CAROL JEAN KAZIMIR, Laboratory Supervisor
Structure Probe, Inc.
Metuchen NJ

and

Laboratory Manager
Structure Probe, Inc.
Fairfield, CT

Education

1970-1973 Middlesex County College
Edison, NJ

Professional Societies

1. Society of Cosmetic Chemists (SCC)
2. Electron Microscopy Society of America (EMSA)
3. The Catalysis Society
4. New England Society of Electron Microscopy
5. South Western CT American Chemical Society
6. New York Microscopical Society-
Attended Bernard Friedman Memorial Microscopy
Workshop, 1980.
7. Microbeam Analysis Society
8. American Association of Candy Technologists

Professional Employment Experience

1981 to date	Laboratory Supervisor Structure Probe, Inc. Metuchen, NJ
1979 to date	Laboratory Manager Structure Probe, Inc. Fairfield, CT
1975 to 1981	Head, Microscopy Services Structure Probe, Inc. Metuchen NJ
1973 to 1975	Microscopist Structure Probe, Inc. Metuchen NJ
1970 to 1973	NL Industries Sayreville NJ

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RESUME

J. STEPHEN DUERR, Technical Director
Structure Probe, Inc.
Metuchen NJ

Education

Ph.D. 1971 Metallurgy
M.I.T., Cambridge MA

M.S. 1967 Metallurgy
B.S. 1965 M.I.T., Cambridge MA

Professional Engineer - State of New Jersey License No. 27047

Professional Societies

1. American Society for Metals (Chairman, NJ Chapter)
2. American Institute of Metallurgical Engineers
3. American Welding Society
4. Microbeam Analysis Society
5. Sigma Xi
6. American Society for Testing and Materials
7. International Society for Hybrid Microelectronics
8. National Association of Corrosion Engineers
9. The Metal Science Club of New York
10. Aircraft Owners and Pilots Association (Private
License with ASEL and Instrument Ratings-over 300 hrs.)
11. Association of Consulting Chemists and Chemical Engineers

Professional Employment Experience

Dec. 1978 to date President
Metuchen Analytical, Inc.
Metuchen NJ

March 1977 to date Technical Director
Structure Probe, Inc.
Metuchen NJ

April 1974 to March 1977 Director, Analytical Services
PhotoMetrics, Inc.
Lexington MA

June 1971 to April 1974 Senior Metallurgist
Bettis Atomic Power Laboratory
Westinghouse Electric Corp.
West Mifflin PA

June 1965 to June 1966 Metallurgist
Battelle Memorial Institute
Columbus OH

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E. POLICY STATEMENT

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POLICY STATEMENT

This analysis has been made and report prepared based upon the specific samples provided to us by Guardian Construction Co. We assume no responsibility for variations in quality (composition, appearance, performance, etc.) or any other feature of similar subject matter produced (manufactured, fabricated, etc.) by persons or under conditions over which we have no control.

The analytical services have been performed, findings obtained, and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

Our reports are rendered upon the condition that they are not to be reproduced wholly or in part for advertising and/or other purposes over our signature or in connection with our name without special permission in writing.

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